



The notch of the mandible: what do different fields call it?

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Abstract: The bony notch on the inferior border of the mandible, anterior to the attachment of the masseter muscle, where the facial vessels commonly pass, has been called different names in the literature, *e.g.*, premasseteric notch, antegonial notch, and notch for the facial vessels. Interestingly, various disciplines have leaned toward different names for this notch. Therefore, to aid in consistent communication among professionals, the present study aimed to analyze usage of these varied terms and make recommendations for the best terminology. Based on the adjacent anatomical structures used to name this notch, three groups were analyzed in this study, a group using masseter in the term, a group using gonion in the term, and a group using facial vessels in the term. A literature search found that the group using gonion in the term was found most in the literature. The orthodontics field used gonion in the term the most (29.0%: 31/107) followed by the oral and maxillofacial surgery field (14.0%: 15/107), the plastic surgery field (4.7%: 5/107), and the anatomy field (3.7%: 4/107). The dental field used gonion in this term the most (43.9%: 47/107) and the medical field used facial vessels in the term the most (33.3%: 6/18). Based on these results, the use of gonial terms for this notch seems to be preferred.

Key words: Terminology, Facial artery, Mandible, Gonion, Masseter

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Introduction

In oral surgery, the facial artery can be at risk for injury during various surgical procedures of the posterior mandible such as during releasing incisions or mandibular third molar extraction [1, 2]. One anatomical landmark used to identify

this vessel is a variant bony notch located on the inferior border of the mandible which is also anterior to the attachment of the masseter muscle (Figs. 1, 2) [3]. However, there is no evidence that this notch on the mandible is due to the overlying facial vessels [4]. In adults, the depth of the notch varies with an average of 2.0 ± 1.1 mm [4, 5].

In general, this anatomical structure has been referred to as the antegonial notch [6], premasseteric notch [6, 7], or notch for the facial vessels [3]. Interestingly, none of these names is included in the second edition of *Terminologia Anatomica* (TA2) [8]. Although slight variation exists for these three terms such as the notch for the facial artery, all of the terms including synonyms are derived from one of three

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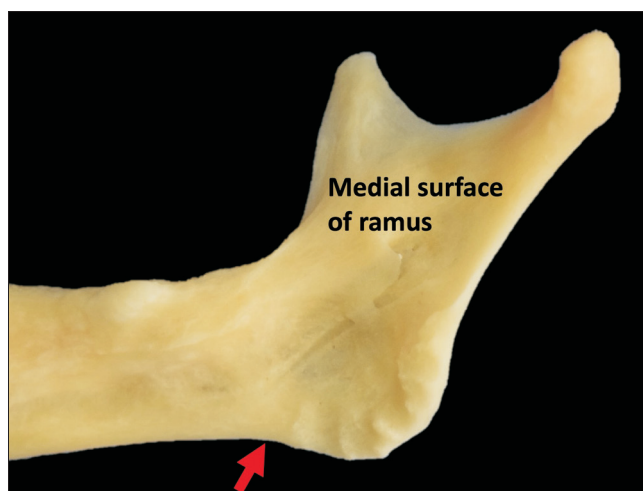


Fig. 1. A bony notch located on the inferior border of the mandible (arrow).

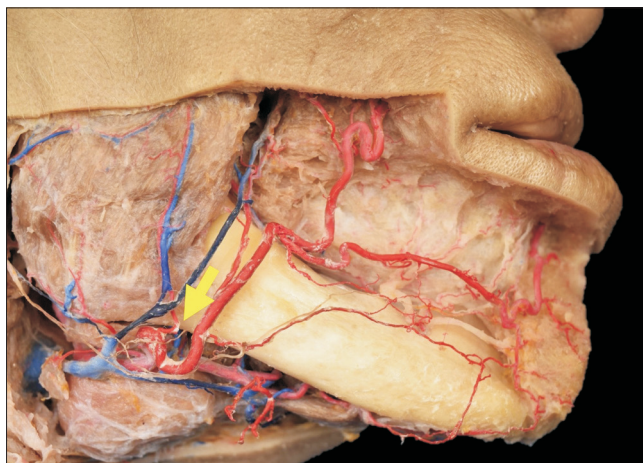


Fig. 2. A bony notch located on the inferior border of the mandible and anterior to the attachment of the masseter muscle (arrow). Note the facial vessels runs adjacent to the notch.

anatomical structures: the gonion, masseter muscle, or facial vessels. Each of these terms is found in reports in the scientific literature but without a consensus on the best term [3, 6, 9]. Therefore, to aid in consistent communication among professionals, the present study aimed to analyze usage of these varied terms and make recommendations for the best terminology.

Materials and Methods

Groups for search words

Based on the neighboring anatomical structure related to the name of the notch, the terms for the notch were classified

Table 1. Three groups for the terms for the notch

Group	Terms	Variations on the terms listed on the left
Masseter	Premasseteric notch [8]	
Gonion	Antegonial notch [6]	Gonial notch [13]
Facial vessels	Notch for the facial vessels [3]	Facial artery notch [14], facial notch [15], groove for the facial artery [16]

into three groups; masseter, gonion, and facial vessels groups (Table 1) [3, 6, 9-13].

- Masseter group for “premasseteric notch”
- Gonion group for “antegonial notch” OR “gonial notch”
- Facial vessels group for “facial notch”, “facial artery notch”, “notch for the facial vessels”, OR “groove for the facial artery”

Literature search

A literature search was conducted using PubMed and Google Scholar by the first author on June 24, 30 and July 16, 2022. All articles shown in the database were initially used for analysis. “Premasseteric notch”, “antegonial notch” OR “gonial notch”, and “facial notch”, “facial artery notch”, “notch for the facial vessels”, OR “groove for the facial artery” were used as search words. The data were extracted from PubMed. Octoparse (Octopus Data Inc.) was used to export data from Google Scholar. Duplicated articles were excluded. For the masseter, gonion, and facial vessels groups, 28, 1781 and 122 papers were identified, respectively.

Full text assessment excluding the reference lists was conducted for papers in the English literature. If the search word was found in the article, the article was included in the review of the publication decade and the field of expertise. In the gonion group, the first 150 of 1,781 articles were reviewed. Finally, 4, 107 and 18 articles for the masseter, gonion, and facial vessels groups were identified, respectively. Analysis of reports in these articles regarding the field of expertise and publication year was conducted on all 129 articles.

Field of expertise

The field of expertise of the article was determined by the first authors' affiliation and categorized into anatomy, oral and maxillofacial surgery, orthodontics, pediatric dentistry, otolaryngology, plastic surgery and others. The fields of expertise were subcategorized into three different subfields *i.e.*, the anatomy field (anatomy), the dental field (oral and maxillofacial surgery, orthodontics, and pediatric dentistry), and the medical field (otolaryngology and plastic surgery).

When multiple fields of expertise were identified for the

first author, the first field was chosen, *e.g.*, “pediatric dentistry and orthodontics” was classified as pediatric dentistry. The department of *Clinical oral oncology* was classified as oral and maxillofacial surgery. Anthropology, histology, oral medicine, and stomatology were classified as ‘other’. If no department/ division was listed, the article was classified as ‘other’.

Statistical analyses

Statistical analyses were performed using IBM SPSS Statistics for Windows, Version 25.0 (IBM Co.). The relationships between the anatomy, dental and medical groups were analyzed by chi-square goodness-of-fit test. In all analyses, the significance level was set at $P < 0.05$.

Results

Publication year

The majority of the literature (62.8%: 81/129) analyzed was published after 2010 (Fig. 3, Table 2).

The fields of expertise and groups

The gonion group had the largest number of publications

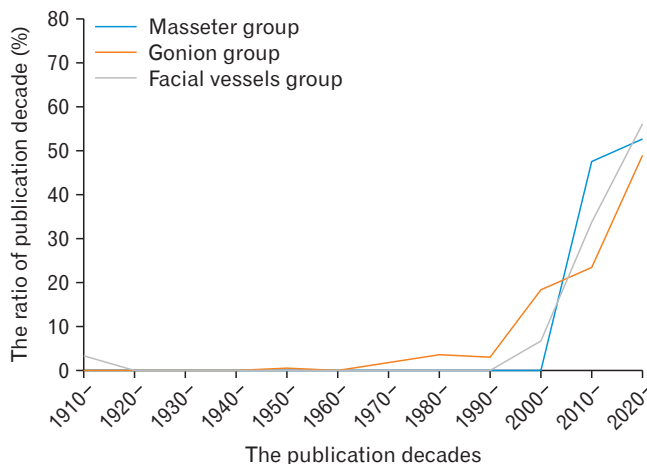


Fig. 3. The ratio of publication decades for each group. The indicated value for 2020–2022 is a value adjusted to a value of a decade by multiplying 10/3.

Table 2. Number of publications after 2010

Group	No. of publications after 2010	Total
Masseter	4 (100.0)	4
Gonion	62 (57.9)	107
Facial vessels	15 (83.3)	18
Total	81 (62.8)	129

Values are presented as number (%).

(even after eliminating the number of publications for review from 1,781 to to 150) (Fig. 4).

The orthodontics field had the largest number in the gonion group (29.0%: 31/107) followed by the oral and maxillofacial surgery field (14.0%: 15/107), plastic surgery field (4.7%: 5/107), and anatomy field (3.7%: 4/107). Oral and maxillofacial surgery was the only field of expertise which used all three groups.

The subfields of expertise and groups

In the gonion group, the dental field made up 43.9%: (47/107). There was a statistically significant difference between usage in the dental and medical fields ($P = 0.000$). In the facial vessels group, the medical field used such terms in 33.3% (6/18). There was a statistically significant difference between usage in the dental and medical fields ($P = 0.005$) (Fig. 5).

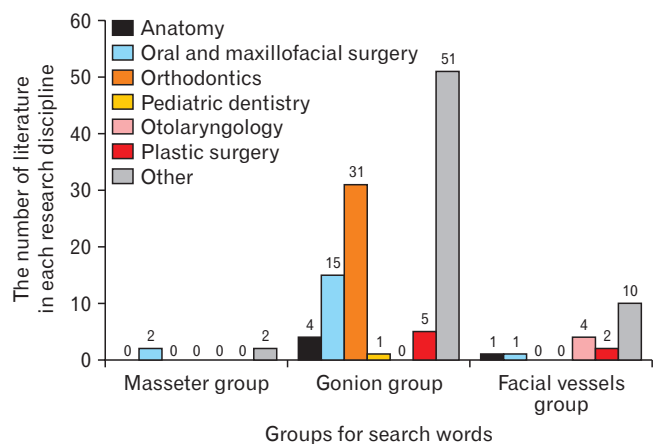


Fig. 4. The number of reports in the literature for fields of expertise in each group.

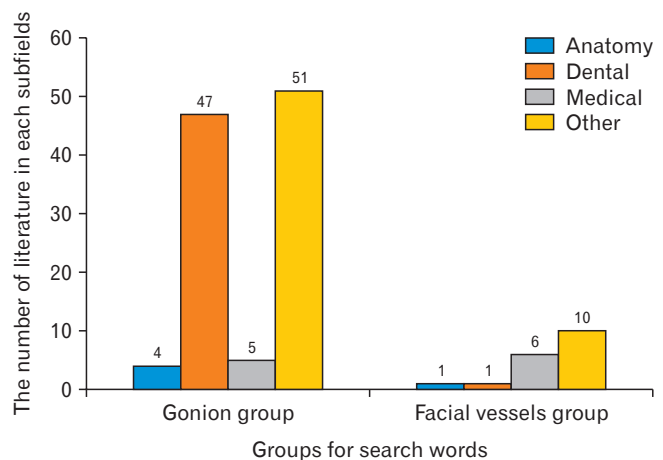


Fig. 5. The ratio of usage in the dental and medical subfields for the gonion and facial vessels groups.

Discussion

Most frequently used group terms for the notch

Based on our analysis, the gonion group had the largest number with 47 articles. This shows that the gonion group term was the most frequently used term in scientific publications when compared to masseter-related or facial vessels-related terms.

Contribution of the masseter to the notch

The contribution to the development of the notch had been investigated in some studies on the masseter. In patients with hypoplasia of the mandibular ramus, a deep notch for the facial vessel often occurs [6, 14]. Other reasons for these notches include that they are developmental or due to the exaggerated pull on the mandible in this region by the insertion of the masseter and the medial pterygoid muscles. The correlation between masseter muscle activity and depth of the notch has also been observed in a normal occlusion group [15]. The notch has been found to be deeper in males than in females [5, 16]. This difference between males and females may be caused by the difference in masseter muscle mass between the sexes.

Use in different fields/subfields of expertise

The orthodontics field had the most usage of the gonion group. Although the total number of the articles in each field of expertise on PubMed or Google Scholar was not considered in this study as the number might be too large for analysis, both orthodontists and oral and maxillofacial surgeons generally use gonion group terms for orthodontic treatment and orthognathic surgery during their cephalometric analysis. In the gonion group, there was a statistically significant difference between the dental and medical subfields. Therefore, the gonion could be considered a more dentally related term. In the facial vessels group, there was a statistically significant difference in the dental and medical subfields. Therefore, the 'facial vessels' group could be considered a more medically related term.

There was much more use of gonion group terms compared to the masseter or facial vessels groups. The anatomical structure (notch) was mostly used by orthodontics and oral and maxillofacial surgery fields. Based on the initial search of the literature, the number of eligible articles was much higher in the gonion group than in the other two groups. Therefore, the gonion group (antegonial notch or go-

nial notch) might be the most appropriate term for the notch.

As the present notch might not seem to be significantly important in anatomy field especially gross anatomy education, it has not been discussed in detail. However, the notch is a part of the facial structure which needs to be discussed by both dental and medical specialists in different approach. This could be the reason why there are different usage in different field. In the future, survey from all over the world and fields such as a Delphi study should be done for this term [17, 18].

Limitations

There are limitations to this study. The data included were based only on papers retrieved from PubMed and Google Scholar searches. Some journals are not listed on PubMed or Google Scholar and therefore, terms used in such journals would not be included in our data analysis. The countries of the articles written were not considered in this study which might be related to the frequency of use of terms in various geographical regions.

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Author Contributions

Conceptualization: RST, JI. Data acquisition: NK, JI. Data analysis or interpretation: NK, KF, YM. Drafting of the manuscript: NK, KF, YM. Critical revision of the manuscript: SI, RST, JI. Approval of the final version of the manuscript: all authors.

Conflicts of Interest

No potential conflict of interest relevant to this article was reported.

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